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HAY FEVER AND ITS SPECIFIC TREATMENT

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Hay fever is a disease, the mortality of which is nil. But any disease from which an individual may suffer from four to eight weeks each summer for the greater part of his life, as he does with this condition, is one which calls urgently for relief in some form.

That hay fever is the result of anaphylactic reaction to the proteins contained in the pollens of certain grasses and plants, has long been known. However, it is only within the last twenty years that any definite explanation has been advanced for its occurrence in a limited number of individuals, when all others in the same communities are equally exposed.

Richet introduced the term "anaphylaxis" to designate a state of hypersensitiveness to toxins. It is strictly opposed to prophylaxis and is distinctly disadvantageous to the host. Later studies by many different workers have shown that hay fever is a manifestation of anaphylaxis in individuals sensitized to the proteins (the toxins) contained in the pollens of certain plants and grasses.

Heredity seems to play a strong part in the tendency toward hay fever. About fifty per cent. of the cases give a family history of some form of sensitization. (It may be stated that this need not necessarily be hay fever, but may be any of the other manifestations of anaphylaxis, such as bronchial asthma, urticaria, angio-neurotic edema and, possibly, eczema.) On the other hand, only fourteen per cent. of normal individuals give such a family history.

The age of onset is earlier in those with such a family history; the more complete the history, the earlier the symptoms are likely to occur.

The symptoms of hay fever are so well known as to need little description. There is a marked swelling of the nasal mucosa. In some cases the mucosa is fiery red and in others it is very pale. A period during which the nose is completely occluded may be followed by one permitting a fairly free passage of air through one or both sides, or the occlusion may persist the greater part of the time. It is very likely to be at its worst in the early morning. The conjunctiva are red and there is often marked itching of the eyes, nose, and often of the roof of the mouth. There is watering of the eyes and nose, and much sneezing, which often occurs in paroxysms. Occasionally the irritation extends to the larynx, causing hoarseness and

some cough. The patient presents the appearance of a person with a very marked rhinitis, but differs from him in that his condition persists from four to eight weeks, while the case of rhinitis ordinarily clears up in four to eight days.

Of course there are all grades of severity, from the very mild case with only an occasional paroxysm of sneezing to the very severe one, in which the patient is confined to his bed. During the seasons which favor the growth of the plants, the cases are invariably much worse than they are during years which are inimical to the plants' best development.

As has been stated, the exciting cause is the pollen of certain plants. In general there are two hay fever seasons, the early one, from about the first of June until the middle of July, and the late one, from the middle of August until the first heavy frost. As a matter of fact, there is still a third one, which occurs in April or early in May, when some of the trees are pollinating, but it is of such short duration that it has no practical bearing.

It has been found that the pollens most commonly causing the cases of early hay fever, are those of the grasses, timothy and red top, with timothy far in the lead. Others which have been found to give skin reactions (which will be explained later) are June grass, sweet vernal, orchard grass, rye, wheat, rose, honeysuckle and privet.

The pollens most commonly causing the late cases are those of two varieties of rag-weed and two varieties of golden rod, with rag-weed leading. Others which sometimes give skin reactions are daisy, chrysanthemum, dahlia, zenia, clematis, marsh grass and asters.

When one considers the physical characteristics of the various plants, he will see why the pollen of the timothy and rag-weed (the worst offenders) are so much more likely to be widespread than those of the rose and the golden rod, for instance. Both timothy and ragweed have inconspicuous blossoms, with no bright colors or strong perfumes, with which to attract insects. Therefore, they must produce pollen in vast quantities, with the individual grains very light in weight, and trust to the winds to bear them from one plant to another to complete the process of fertilization. Because it is so light and in such quantity, there is always much of it in the air during the pollinating seasons, and considerable amounts will reach the nasal and conjunctival mucous membranes of all individuals in the regions where such plants exist.

On the other hand, such plants as the rose and the golden rod have brilliant colors, and some odor, to attract the insects. They produce comparatively small amounts of pollen, which unlike the wind-blown pollen of the ragweed and timothy, is composed of rather

heavy and sticky grains which will adhere to the bodies of insects and so be transmitted from flower to flower.

Admitting, then, that hay fever is caused by pollens, the problem arises as to which pollens are responsible for the symptoms in an individual case. The answer to this problem rests on the principle that not only are the cell of the nasal and conjunctival mucous membranes sensitized to the proteins of the pollens, but so are those of other epidermal structures, such as the skin.

There are three ways of testing a person's sensitiveness to foreign protein:

(1) The scratch test on the skin; (2) The intradermal test; and (3) The occular test.

(1) The scratch test is made by applying to the skin the protein to be tested, dissolved in normal salt solution or weak sodium hydroxide solution, and making a small scratch through the solution about one-eighth inch in length. This should go just deep enough to penetrate the outer layers of the skin and not deep enough to draw blood.

(2) The intradermal test consists in the introduction of the protein solution into (not through) the skin. This is best done with a tuberculin syringe and a fine needle. About 1/50 cubic centimeter is injected, raising a small white wheal.

A positive reaction in either case consists of a raised whitish, urticarial wheal, varying in size from one-half to three centimeters in diameter, with irregular pseudopods extending into the surrounding tissues, and the whole surrounded by a zone of hyperemia. The reaction appears in from five to thirty minutes and persists from two to four hours and then gradually fades, leaving at times, for a day or two, a faint brownish discoloration. In some cases there is some itching in the region.

(3) The occular or conjunctival test is made by instilling a drop of the protein solution inside the eyelid. A positive reaction consists in a reddening of the conjunctiva, with lacrymation and itching. If some of the solution runs down the tear duct into the nose, there will be swelling of the nasal mucous membrane, with watering of the nose and sneezing. The test is necessarily limited in its application.

In the non-sensitive case, no reaction follows any of the tests. With the scratch test, especially, it is possible to determine varying degrees of sensitiveness so that that pollen which gives the strongest reaction, can be chosen for treatment.

As to treatment, there are two methods which give very good results:

(1) The more successful is to have the sensitized individual go

to some locality where there are none of the pollen producing plants to which he is sensitized, and remain there throughout the hay fever season. However, this is only rarely possible.

(2) The second consists in de-sensitizing the patient by repeated, small subcutaneous injections of a solution of the pollens causing the trouble, in his individual case.

Before beginning treatment, it is absolutely necessary to learn which pollen is the causative agent in the given case. At times, several will give positive skin reactions. In such cases it becomes a matter of judgment which shall be used. Although several may react positively, almost always there will be one which will give a stronger reaction than any of the rest, and of course such an one should be used. It has been found by experience that desensitizing with timothy pollen will give relief in the greater number of the early cases, while ragweed gives the same results in the later cases. Therefore, unless some other pollen solution gives a reaction equally as strong as either of these, they are the ones which are generally used. Treatment with a pollen which is not causing the trouble will do no good but may do a considerable amount of harm.

There are three methods of desensitizing treatment: (1) Prophylactic, or pre-seasonal, that is, the treatment is completed before the hay fever season begins: (2) phylactic, or during the season, that is, after the symptoms have appeared and, (3) the combination of the two.

No matter which method is used, familiarity with the preparation of pollen extract to be administered is absolutely necessary. Several are on the market, which are very good, but each manufacturer has his own method of standardization, and an amount of one extract that might be perfectly harmless, might, of another, cause serious symptoms, or even death.

The first dose must always be small enough not to cause any reaction in the patient. These reactions vary from the mild ones, with only a slight redness and soreness about the site of the injection to the more severe ones, which may manifest themselves as asthma, urticaria, or the more marked symptoms of anaphylactic shock with prostration, faintness, rapid and weak pulse, etc. To escape these reactions, the skin test must be the guide. The more marked the reaction to the test, the more sensitive is the patient, and the smaller must be the initial dose. It may be remarked, parenthetically, that not only do the more sensitive patients require the smaller doses, but they also respond more satisfactorily to the treatment.

With the combined pre-seasonal and seasonal treatment, it is preferable to begin treatment from six to ten weeks before the time

of expected symptoms, with the longer interval as the choice. Starting with a very small dose, by means of weekly injections, the dosage is gradually increased until the beginning of the hay fever season, when it is wisest either to retain the same dose for several injections or else drop back to about half the maximum dose and very cautiously increase again until about one week before the end of the season can be expected, when treatment is stopped. The halt, or the drop back at the beginning of the season, is necessary because we have no means of knowing how much pollen protein the individual is absorbing through the mucous membranes of his eyes and nose, and care must be used not to overload him by means of the subcutaneous injections so that he will lose what immunity he may have gained and be worse off than he would have been had he had no treatment.

When a patient who already has symptoms, presents himself for treatment, experience has shown that the best method consists in giving him the same very small amount of the proper pollen extract, each day for three or four successive days, then skipping to alternate days for a few injections, and very slowly increasing the doses, then gradually lengthening the interval until his last injections may be from five to eight days apart. Here again, treatment may be stopped about a week before the expected end of the season.

The writer has had no experience with the method of completing the treatment before the season begins, but very good results have been reported by at least one worker. With this method, treatment is begun twelve to fourteen weeks before the season begins, and starting with a small dose, the amount is gradually increased at weekly intervals, until the last doses, which are given just before the time when symptoms are expected, are comparatively very large ones.

Two experiences of the writer may serve to emphasize the necessity of caution in treating these sensitized patients. In the first case, the patient ordinarily had her first symptoms of hay fever about the third week in August. She appeared for treatment the first week in July and was tested in the usual way. She gave a very strong reaction to ragweed, and treatment with an extract of this pollen was begun, with a dose below the average in size. Nevertheless, she was so very sensitive that she had a reaction manifested by an attack of hay fever which lasted for five days, at a season of the year when ordinarily she is perfectly free. The second dose was made smaller than the first and from that time on, by making the increase in strength very gradual, no further trouble was experienced.

The second case was that of a young man who had been convinced by experience that ragweed was at the bottom of his trouble. About 1/50 C.C. of a solution of ragweed pollen extract was injected

into his skin, the amount that is usually used, and which at the most gives only a local reaction. Within less than a minute after the injection, he became pale, and faint. The perspiration poured from him. His pulse was rapid, small and weak and he complained of pain in the abdomen. These symptoms all passed away within half an hour. In this case, if he had been given a subcutaneous injection of ragweed pollen extract, even an unusually small one, it is well within the bounds of possibility that he would have died. At the least, he would have been extremely uncomfortable, because material is absorbed quickly from subcutaneous injections and very slowly from intradermal injections.

Such reactions as these are very rare when ordinary caution is exercised, but they might easily become decidedly serious if great care is not used.

What shall be told a patient as to his chances of relief? In the first place he must understand that the treatment must be repeated each year, because whatever de-sensitization he acquires is temporary in character, as illustrated by the need of the weekly injections. It is also best to warn him that he is likely to have at least a little sneezing and some running of the nose, because few patients are absolutely freed of symptoms. But in general he can be assured that eighty per cent. of the patients are relieved of eighty per cent. of their symptoms, and that, therefore, the prospect of a great deal of relief in his individual case is very good, better in fact, than with almost any chronic condition.

SUMMARY:—Hay fever is an anaphylactic reaction, in sensitized individuals, to the proteins contained in the pollens of certain plants and grasses. These proteins find a portal of entry into the organism through the nasal and conjunctival mucous membranes.

It is possible, through very simple and painless skin tests to determine the exact cause of the condition. Having learned the offending pollen, a theraphy, as specific as antitoxin in diphtheria, is available and offers relief of 80 per cent. of the symptoms in 80 per cent. of the cases.

The partial de-sensitization obtained is not permanent, but treatment must be repeated each year.